Modifying the Orchard Landscape to Help Reduce SWD Populations in Michigan Cherry Orchards

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Objective

- Establish reliable and cost effective ways to modify orchard landscapes to make tart cherry less suitable for SWD
  - Tart cherries grown on standard rootstocks
    - Large trees have dense canopies
    - Traditional sod row middles
      - Contribute to humidity in orchard?

Orchard Modifications

- Pruning strategies
  - No pruning
  - 25% more pruning than a normal year
  - 25% less than a normal year
- Under tree canopy modifications
  - Wood chips
  - Weed fabric
  - Growers' standard
    - Weed spray in June with minimal weed growth prior to harvest
- Orchard row middle modifications
  - Sod row centers mowed every two weeks
  - Sod row centers not mowed throughout season
  - Herbicide used to maintain bare ground throughout season
  - Herbicide followed by tilling every two weeks throughout the season

* No insecticide applications were made in any treatments in 2017

Methods

- Treatments applied to a contiguous ~150 trees
  - 15-17 year-old Montmorency
- Temp/humidity data loggers in canopy/ground from 15 June – 15 August
- Two adult SWD traps/treatment
- 100 fruit collected weekly/rep June 26 - harvest
- 3 gallons of fruit collected off shaker at harvest
- Yields/treatment @ harvest
- Weekly vacuum samples of row middles/under canopy June 26 - harvest

Pruning Treatments

No Pruning:
No limb removal

25% Less Pruning:
Remove 6 limbs

25% More Pruning:
Remove 10 limbs

Under Tree Canopy Treatments

Wood chips

Weed fabric

Grower standard: Herbicide

Orchard Row Middle Treatments

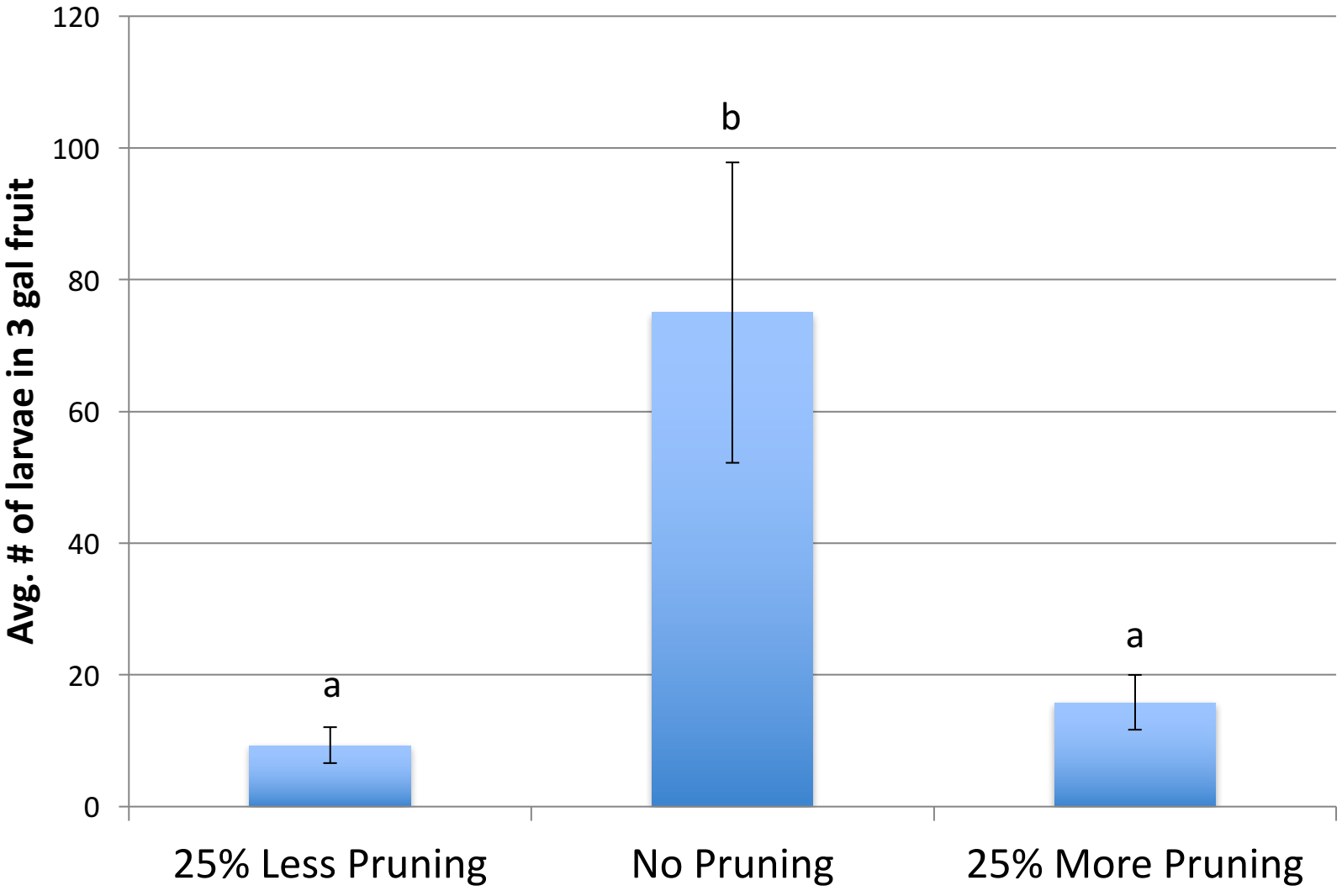
1. Sod row middles mowed every two weeks
2. Sod row middles *not* mowed
3. Herbicide on row middles to maintain bare ground
4. Clean cultivated row middles using herbicide followed by tilling every two weeks

Fruit Collection

Processing Fruit for SWD Larvae

Results

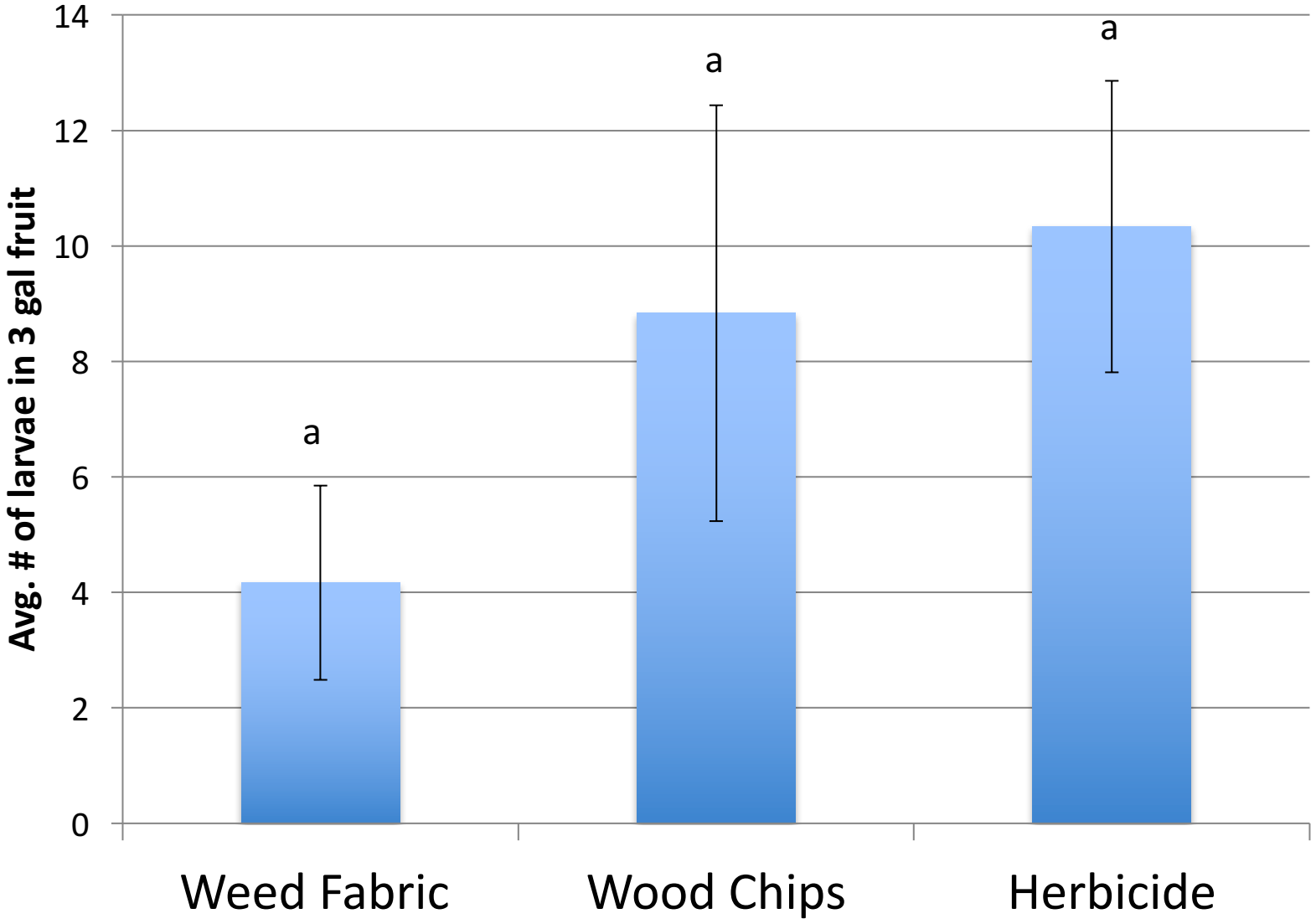
Pruning Treatments



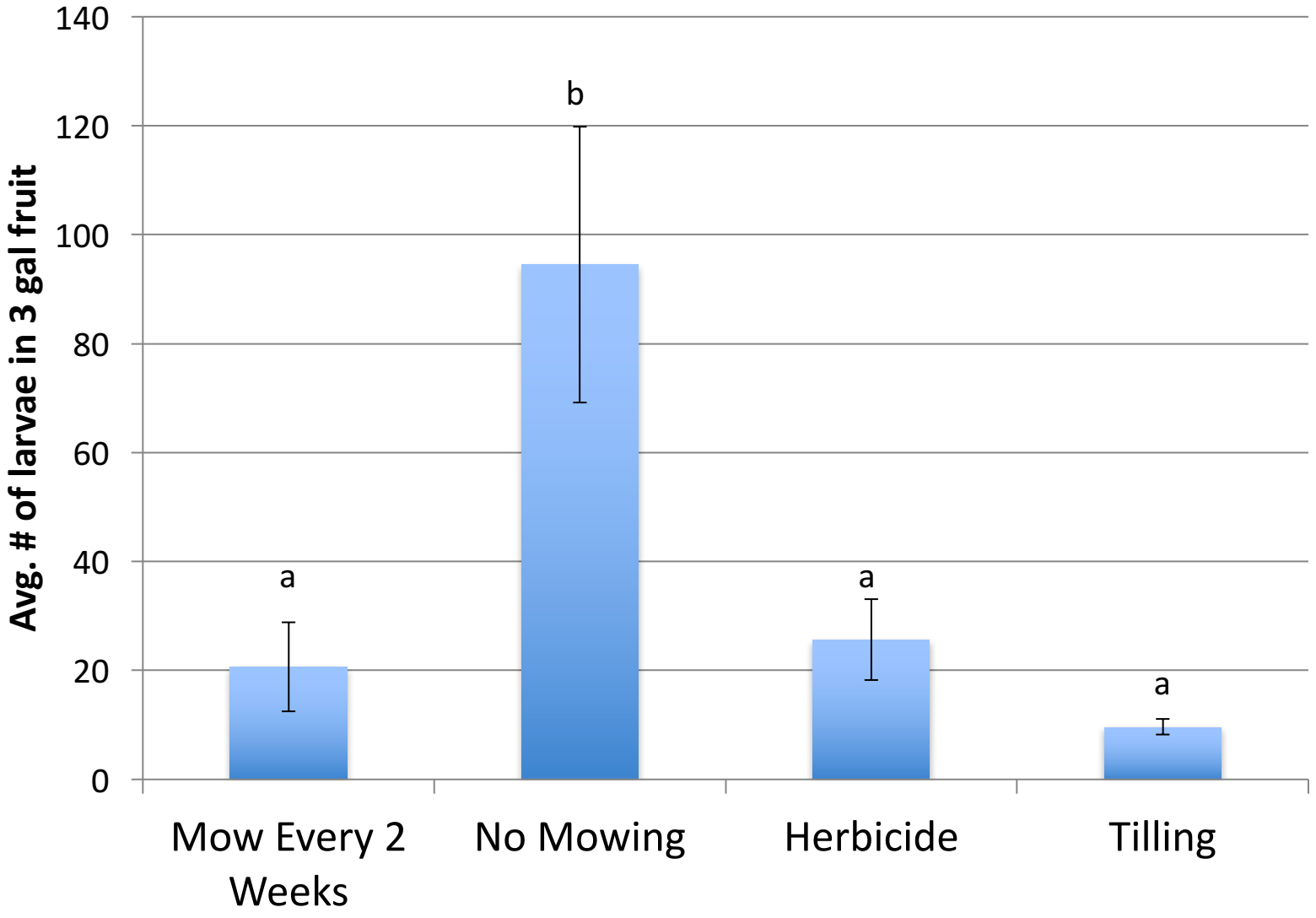
Impact of Pruning on Yield

	Avg. lbs/tree
25% More Pruning	73.6 a
25% Less Pruning	101.3 b
No Pruning	132.0 c

Under Canopy Treatments



Orchard Row Middle Treatments



Canopy Size Can Make a Difference

Treatment	Avg. # Larvae in 3 gal fruit	Tree Age	Harvest Date
UTC Efficacy Trial	0.9	7	24-Jul
25% Less Pruning	9.3	15	25-Jul
No Pruning	75.0	15	25-Jul
25% More Pruning	15.8	15	25-Jul
Weed Fabric	4.2	15	25-Jul
Wood Chips	8.8	15	25-Jul
Herbicide	10.3	15	25-Jul
Mow Every 2 Weeks	20.7	17	25-Jul
No Mowing	94.5	17	25-Jul
Herbicide	25.7	17	25-Jul
Tilling	9.7	17	25-Jul

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Herbicide	25.7	17	25-Jul
Tilling	9.7	17	25-Jul

Conclusions

- Increasing pruning intensity may be an affordable and effective way to reduce SWD
  - Removing 6 to 10 limbs reduced SWD infestation by 40%
    - Data were collected in trees with no insecticide applications
      - Impact of pruning + insecticide = further reduction in SWD #'s
- However, removing 6-8 limbs reduced yields by almost half
- Need to develop annual pruning recommendations to minimize SWD *and* maintain yields
- Canopy size and density influences SWD populations
  - Further impetus to explore high-density tart cherry systems?

Recommendations for 2018

- To help minimize risk from SWD infestation:
  - Prune out 6 major scaffolds in trees 15-year old+
  - Mow orchards at least every two weeks
  - Use insecticide materials rated ‘excellent’
  - Do not stretch insecticide intervals
    - Particularly with pyrethroids
- Experiment will be repeated/expanded next season to develop further recommendations

Thank you!

- NWMHRC lab
- Gut lab @ MSU

Michigan State Horticultural Society

Project GREEEN

MONTMORENCY TART CHERRIES

Michigan Tree Fruit Commission

Insecticide Treatments

- Exirel 17D / Imidan 10D / Exirel 3D
- Delegate 17D / Imidan 10 D / Mustang Max 3D
- Delegate 17D / Imidan 10 D / Danitol 3D
- Exirel 21D / Imidan 14 D / Exirel 7D
- Imidan 21D / Mustang Max 14 D / Imidan 7D
- Harvanta 21D / Imidan 14 D / Harvanta 7D
- Mustang Max + Assail 20D / Mustang Max + Assail 10D
- Mustang Max + Harvanta 20D / Mustang Max + Harvanta 10D
- Mustang Max + Imidan 20D / Mustang Max + Imidan 10D
- UTC

Table 1. Efficacy Results from NWMHRC; Harvest Sample (7/24/17)

Treatment	Avg. # of larvae in 3 gallons of fruit	Fisher's PLSD (0.05)
Delegate 17D / Imidan 10D / Danitol 3D	0	a
Exirel 21D / Imidan 14D / Exirel 7D	0	a
Mustang Max and Harvanta 20D / Mustang Max and Harvanta 10D	0	a
Mustang Max and Imidan 20D / Mustang Max and Imidan 10D	0.25	ab
Mustang Max and Assail 20D / Mustang Max and Assail 10D	0.25	ab
Imidan 21D / Mustang Max 14 D / Imidan 7D	0.25	ab
Delegate 17D / Imidan 10D / Mustang Max 3D	0.5	ab
Harvanta 21D / Imidan 14D / Harvanta 7D	0.5	ab
Exirel 17D / Imidan 10D / Exirel 3D	1	ab
Untreated Control	5.5	c

Table 2. Efficacy Results from NWMHRC; 1 week Post-Harvest Sample (7/31/17)

Treatment	Avg. # of larvae in 3 gallons of fruit	Fisher's PLSD (0.05)
Delegate 17D / Imidan 10D / Danitol 3D	1.5	a
Exirel 17D / Imidan 10D / Exirel 3D	2.5	ab
Exirel 21D / Imidan 14D / Exirel 7D	2.75	ab
Mustang Max and Harvanta 20D / Mustang Max and Harvanta 10D	7.25	b
Mustang Max and Imidan 20D / Mustang Max and Imidan 10D	7.25	b
Delegate 17D / Imidan 10D / Mustang Max 3D	7.25	b
Mustang Max and Assail 20D / Mustang Max and Assail 10D	8.5	b
Harvanta 21D / Imidan 14D / Harvanta 7D	15.25	bc
Imidan 21D / Mustang Max 14D / Imidan 7D	15.5	bc
UTC	154.75	c

Efficacy Results

- All treatments were significantly different than the UTC in the harvest timing sample
  - 1) Delegate 17D / Imidan 10D / Danitol 3D, 2) Exirel 21D / Imidan 14D, and 3) Mustang Max and Harvanta 20D /Mustang Max and Harvanta 10D = no larvae
- Jet Ag at a 1% solution followed by Delegate improved the efficacy of Delegate compared to Delegate alone
- Yeast did not improve the efficacy
- One week post harvest sample Delegate 17D / Imidan 10D / Danitol 3D was numerically best program
- Exirel 17D / Imidan 10D/ Exirel 3D and the Exirel 21D Imidan 14D / Exirel 7D programs had statistically fewer larvae